





EXAM REVIEW

1. Complete the table below.

WHMIS Symbol	Name	Chemical where it's found
	Compressed gas	gas cylinders
	poisonous	copper (II) sulfate
	flammable and combustible	sodium, potassium alcohols
	corrosive	acids bases

2. Complete the chart below.

name of element	atomic #	mass #	# of electrons	# of protons	# of neutrons	symbolism
europium	63	153	63	63	90	${}_{63}\text{Eu}^{153}$
tellurium	52	127	52	52	75	${}_{52}\text{Te}^{127}$
tungsten	74	186	74	74	112	${}_{74}\text{Te}^{186}$
strontium	38	88	38	38	50	${}^{88}\text{Sr}$

3. What are isotopes?

- 2 atoms with the same # of protons and a different number of neutrons

4. What are radioisotopes? Give 2 uses of radioisotopes.

- Unstable atoms that give radioactive radiation
- Uses: carbon dating, medical testing

5. Bromine has 2 isotopes. Br-79 with a relative abundance of 50.69% and Br-81 with a relative abundance of 49.31%. Calculate the average atomic mass of bromine.

$$\begin{aligned}
 \text{Average Atomic Mass} &= (\% \text{ Br-79} \times 79 \text{ amu}) + (\% \text{ Br-81} \times 81 \text{ amu}) \\
 &= (0.5069 \times 79 \text{ amu}) + (0.4931 \times 81 \text{ amu}) \\
 &= 40.05 \text{ amu} + 39.94 \text{ amu} \\
 &= 79.99 \text{ amu}
 \end{aligned}$$

Therefore the average atomic mass of bromine is 79.99 amu.

6. Europium has 2 isotopes Eu-151 with a relative abundance of 47.8% and Eu-153 comprising the remainder. Calculate the average atomic mass of Europium.

$$\begin{aligned}
 \% \text{ abundance Eu-153} &= 100 - 47.8 \\
 &= 52.2 \%
 \end{aligned}$$

$$\begin{aligned}
 \text{Average Atomic Mass} &= (\% \text{ Eu-151} \times 151 \text{ amu}) + (\% \text{ Eu-153} \times 153 \text{ amu}) \\
 &= (0.478 \times 151 \text{ amu}) + (0.522 \times 153 \text{ amu}) \\
 &= 72.18 \text{ amu} + 79.87 \text{ amu} \\
 &= 152.05 \text{ amu}
 \end{aligned}$$

Therefore the average atomic mass of europium is 152.05 amu.

7. Give 3 properties of ionic compounds and 3 properties of covalent or molecular compounds.

	Ionic Compounds	Covalent Compounds
Types of elements involved	- metal + non-metal	- 2 non-metals
Example	- sodium chloride, calcium iodide	- water, carbon dioxide
Properties (3 for each)	<ul style="list-style-type: none"> - high melting and boiling points - crystalline solids - dissolve in water - conduct electricity when melted or when dissolved in water 	<ul style="list-style-type: none"> - low melting and boiling points - gases or liquids at room temperature - do not dissolve in water but will dissolve in non-polar solvents - do not conduct electricity in any form

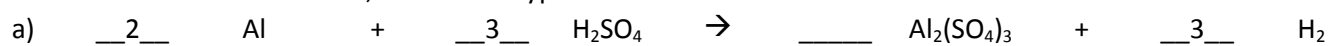
8. Name the following

A)	MgF ₂	magnesium fluoride
B)	Cu ₂ SO ₄	copper (I) sulfate
C)	Ni(OH) ₃	nickel (III) hydroxide
D)	Li ₃ PO ₃	lithium phosphide
E)	Zn(ClO) ₂	zinc hypochlorite
F)	PbO ₂	lead (IV) oxide
G)	NaIO ₂	sodium iodite
H)	RbCNO	rubidium cyanate
I)	AlP	aluminum phosphide
J)	Cl ₂	chlorine
K)	CaSiO ₃	calcium silicate
L)	Ag ₂ CrO ₄	silver chromate
M)	H ₂ SO ₃ (aq)	sulfurous acid
N)	HBrO ₃ (aq)	bromic acid
O)	HCl _(aq)	hydrochloric acid
P)	SO ₃	sulfur trioxide
Q)	IBr ₇	iodine heptabromide
R)	XeF ₄	xenon tetrafluoride
S)	P ₄ O ₁₀	tetraphosphorus decoxide
T)	NO	nitrogen monoxide

9. Write formulas for the following.

A)	cobalt (III) fluoride	CoF_3
B)	chromium (III) iodate	$\text{Cr}(\text{IO}_3)_3$
C)	sodium selenite	Na_2SeO_3
D)	ammonium chloride	NH_4Cl
E)	oxygen	O_2
F)	potassium nitrite	KNO_2
G)	iron (III) sulfide	Fe_2S_3
H)	tin (IV) carbonate	$\text{Sn}(\text{CO}_3)_2$
I)	silver cyanide	AgCN
J)	sulfur	S_8
K)	gallium phosphate	GaPO_4
L)	lead (II) carbide	Pb_2C
M)	chlorous acid	HClO_2
N)	arsenic acid	H_3AsO_4
O)	hypophosphorous acid	H_3PO_2
P)	carbon dioxide	CO_2
Q)	diphosphorus pentoxide	P_2O_5
R)	nitrogen dioxide	NO_2
S)	silicon tetrachloride	SiCl_4
T)	sulfur hexafluoride	SF_6

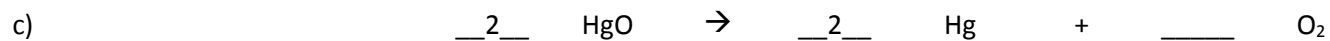
10. For each reaction below, indicate its type and then balance.



Type: _____ SINGLE DISPLACEMENT _____



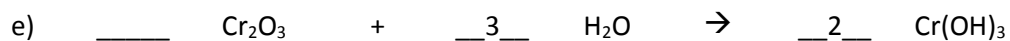
Type: _____ SYNTHESIS _____



Type: _____ DECOMPOSITION _____



Type: _____ SINGLE DISPLACEMENT _____



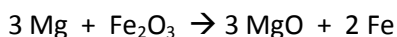
Type: _____ SYNTHESIS _____



Type: _____ DOUBLE DISPLACEMENT _____

11. Use the activity series to determine if the reaction below will occur or not. If the reaction will happen, write a balanced chemical equation.

A) magnesium + iron (III) oxide \rightarrow magnesium oxide + iron

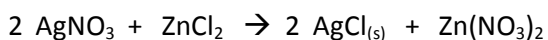


B) silver + zinc chloride \rightarrow NO REACTION (silver is lower than zinc)

C) iron + potassium iodide \rightarrow NO REACTION (iron is lower than potassium)

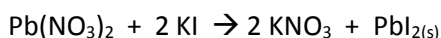
12. For the double displacement reaction below, determine if the reaction will occur or not. If the reaction will occur, write a balanced chemical equation for it. **Put a (s) after the product that is insoluble.**

A) silver nitrate + zinc chloride \rightarrow silver chloride + zinc nitrate



B) sodium sulfate + lithium carbonate \rightarrow NO REACTION (both products are soluble)

C) lead (II) nitrate + potassium iodide \rightarrow potassium nitrate + lead (II) iodide



13. Indicate if the following compounds are soluble or insoluble I water.

Compound	Soluble or Insoluble
sodium chromate	soluble
silver chloride	insoluble
calcium carbonate	insoluble
zinc nitrate	soluble

14. Distinguish between a dilute and concentrated solution.

- A dilute solution has a small amount of solute dissolved in the solvent and a concentrated solution has a large amount of solute dissolved in the solvent.

14. Define the following.

A) solute – the substance being dissolved

B) solvent – the substance doing the dissolving

15. Determine the molar mass of the following.

A) F_2

MM = 38.00 g/mol

B) Na_2SO_4

MM = 142.05 g/mol

C) $\text{Al}_2(\text{CO}_3)_3$

MM= 233.99g/mol

16. Determine the number of moles in each of the following.

A) 8.34×10^{24} atoms of Ca

$$n = \frac{\text{\# of particles}}{N_A}$$

$$n = \frac{8.34 \times 10^{24}}{6.02 \times 10^{23}}$$

$$n = 13.85 \text{ mol}$$

B) 134.5 g of $\text{Ca}(\text{ClO}_3)_2$

$$\text{MM} = 206.98 \text{ g/mol}$$

$$n = \frac{m}{\text{MM}}$$

$$n = \frac{134.5 \text{ g}}{206.98 \text{ g/mol}}$$

$$n = 0.65 \text{ mol}$$

C) 890 mL of 2.6 M NaCl

$$c = \frac{n}{V}$$

$$n = cV$$

$$n = \left(2.6 \frac{\text{mol}}{\text{L}}\right)(0.89 \text{ L})$$

$$n = 2.31 \text{ mol}$$

17. Calculate the number of molecules in 34.50 g of PbI_2 (5 marks)

$$\text{MM} = 461.00 \text{ g/mol}$$

$$n = \frac{m}{\text{MM}}$$

$$n = \frac{34.5 \text{ g}}{461.00 \text{ g/mol}}$$

$$n = 0.075 \text{ mol}$$

$$n = \frac{\text{\# of particles}}{N_A}$$

$$\text{\# of particles} = nN_A$$

$$\begin{aligned} \text{\# of particles} &= (0.075 \text{ mol})(6.02 \\ &\times \frac{10^{23} \text{ molecules}}{\text{mol}}) \end{aligned}$$

$$\text{\# of particles} = 4.51 \times 10^{22} \text{ molecules}$$

18. Calculate the concentration of a solution made by dissolving 2.60 mol of solute in 2350 mL of water. (2 marks)

$$c = \frac{n}{V}$$

$$c = \frac{2.60 \text{ mol}}{2.35 \text{ L}}$$

$$c = 1.11 \text{ mol/L}$$

19. Calculate the mass of $\text{Mg}(\text{NO}_3)_2$ needed to make 3.5 L of 1.4 M solution? (5 marks)

$$c = \frac{n}{V}$$

$$n = cV$$

$$n = \left(1.4 \frac{\text{mol}}{\text{L}}\right)(3.5 \text{ L})$$

$$n = 4.90 \text{ mol}$$

$$\text{MM} = \text{Mg} + 2 \text{ N} + 6 \text{ O}$$

$$\text{MM} = 148.33 \text{ g/mol}$$

$$n = \frac{m}{\text{MM}}$$

$$m = n\text{MM}$$

$$m = (4.90 \text{ mol})\left(148.33 \frac{\text{g}}{\text{mol}}\right)$$

$$m = 726.82 \text{ g}$$

20. What volume of 12 M hydrochloric acid is needed to make 5.50 L of 2.5 M solution?

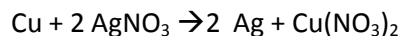
$$c_1 V_1 = c_2 V_2$$

$$V_1 = \frac{c_2 V_2}{c_1}$$

$$V_1 = \frac{(2.5 \text{ M})(5.50 \text{ L})}{12 \text{ M}}$$

$$V_1 = 1.15 \text{ L}$$

21. Copper (Cu) reacts with silver nitrate (AgNO₃) to make copper(II) nitrate (Cu(NO₃)₂) and silver metal (Ag). What mass of Ag is formed from 8.5 g of Cu?



$$n_{\text{Cu}} = \frac{8.5 \text{ g}}{63.55 \text{ g/mol}}$$

$$n_{\text{Cu}} = 0.13 \text{ mol}$$

$$\frac{\text{Ag}}{\text{Cu}} = \frac{2}{1} = \frac{x}{0.13}$$

$$x = 0.26 \text{ mol}$$

$$n = \frac{m}{\text{MM}}$$

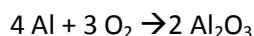
$$m = n \times \text{MM}$$

$$m_{\text{Ag}} = (0.26 \text{ mol}) \left(107.87 \frac{\text{g}}{\text{mol}} \right)$$

$$m_{\text{Ag}} = 28.05 \text{ g}$$

22. When aluminium (Al) is heated in oxygen (O₂), aluminium oxide (Al₂O₃) is formed.

- A) What mass of aluminum oxide can be formed from 25.0 g of aluminum?



$$n_{\text{Al}} = \frac{25 \text{ g}}{26.98 \text{ g/mol}}$$

$$n_{\text{Al}} = 0.93 \text{ mol}$$

$$\frac{\text{Al}_2\text{O}_3}{\text{Al}} = \frac{2}{4} = \frac{x}{0.93}$$

$$x = 0.47 \text{ mol}$$

$$n = \frac{m}{\text{MM}}$$

$$m = n \times \text{MM}$$

$$m_{\text{Al}_2\text{O}_3} = (0.47 \text{ mol}) \left(101.96 \frac{\text{g}}{\text{mol}} \right)$$

$$m_{\text{Al}_2\text{O}_3} = 47.92 \text{ g}$$

- B) If 35.0 g of aluminum oxide is actually made in the reaction, what is the % yield of the reaction?

$$\% \text{yield} = \frac{\text{Actual Mass}}{\text{Maximum Mass from Ratio}} \times 100\%$$

$$\% \text{yield} = \frac{35.0 \text{ g}}{47.92 \text{ g}} \times 100\%$$

$$\% \text{yield} = 73.04 \%$$

23. Give 3 reasons why you never get a 100% yield in a chemical reaction.

1. Collection technique
2. Loss of product during transfer
3. Side reactions
4. Impure reactants
5. Insufficient reaction time